

Serial No.09/975,297
HP Docket No: 10007286-1**REMARKS**

This communication is in response to the Office Action dated October 6, 2003.

Claims 1-14 and 21-31, 34 and 35 are pending in the present Application. Claims 1-14 and 21-29 and 35 have been rejected. Claims 30 and 31 have been canceled. Claims 1, 5, 14 and 21 have been amended for clarification. Claims 30 and 31 have been canceled. Claim 34 has been allowed. Claims 1-14 and 21-31, 34 and 35 are pending in the present Application are pending in the present Application.

The present invention includes an electron emitter that may include an n+ region formed above the substrate, in which the n+ region is formed by doping the substrate with electron rich materials. The p region may then be formed by epitaxial growth of p-doped semiconductor layer on top of n+ region. The thickness of the p region is preferred to be less than the diffusion length of the electrons in the p region. When both the n+ region and the p region exist, the hole concentration in the p region may be less than the electron concentration in the n+ region.

102 Rejections**Claims 1-3, 6-8 and 12**

For ease of review, Applicant reproduces independent claim 1 herein below:

1. An electron emitter comprising:
a p region;

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a dielectric layer formed in contact with said p region wherein a thickness of said dielectric layer is such that a dielectric breakdown field F_b of said dielectric layer substantially meets the condition $F_b \geq 1.5 * 10^7$ V/cm;

a metallic layer formed in contact with said dielectric layer; and
means for emitting electrons through said metallic layer.

The Examiner states:

Claims 1-3, 6-8 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakagawa et al. (5,985,708).

Applicant respectfully disagrees with the Examiner's rejection and asserts that claim 1 has been amended to include the allowable subject matter of claim 30. Specifically, claim 1 has been amended to include the limitation "...wherein a thickness of said dielectric layer is such that a dielectric breakdown field F_b of said dielectric layer substantially meets the condition $F_b \geq 1.5 * 10^7$ V/cm...". Applicant therefore asserts that the recited invention of claim 1 is not anticipated by the Nakagawa et al. reference. Consequently, the recited invention of claim 1 is allowable over the Nakagawa et al. reference.

Claims 2-3, 6-8 and 12

Since claims 2-3, 6-8 and 12 are dependent on claim 1, the above-articulated argument with regard to claim 1 applies with equal force to claims 2-3, 6-8 and 12. Accordingly, claims 2-3, 6-8 and 12 should be allowed over this reference.

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103 Rejections

Claims 4-5 and 13

The Examiner states:

Claims 4-5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) as applied to claims 1-3, 6-8 and 12 in view of van Gorkom et al. (4,325,084).

Applicant respectfully disagrees with Examiner's rejection. Since claims 4-5 and 13 are dependent on claim 1, the above-articulated argument with regard to claim 1 applies with equal force to claims 4-5 and 13. Accordingly, claims 4-5 and 13 should be allowed over this reference.

Claim 9

The Examiner states:

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkham et al. (4,325,084) as applied to claims 1-3, 6-8 and 12-13 above in view of Morishita (5,140,400).

Applicant respectfully disagrees with Examiner's rejection. Since claim 9 is dependent on claim 1, the above-articulated argument with regard to claim 1 applies with equal force to claim 9. Accordingly, claim 9 should be allowed over this reference.

Claim 10

The Examiner states:

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkham et al. (4,325,084) as applied to claims 1-3, 6-8 and 12-13 above in view of Bronner et al. (6,242,770 B1).

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Applicant respectfully disagrees with Examiner's rejection. Since claim 10 is dependent on claim 1, the above-articulated argument with regard to claim 1 applies with equal force to claim 10. Accordingly, claim 10 should be allowed over this reference.

Claim 11

The Examiner states:

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (3,985,708) and van Gorkham et al. (4,325,084) as applied to claims 1-3, 6-8 and 12-13 above in view of Ishio et al (US 200/0014705 A1).

Applicant respectfully disagrees with Examiner's rejection. Since claim 11 is dependent on claim 1, the above-articulated argument with regard to claim 1 applies with equal force to claim 11. Accordingly, claim 11 should be allowed over this reference.

Claims 21 and 29

For ease of review, Applicant reproduces independent claim 21 herein below:

21. An electron emitter comprising:

a p region;

a dielectric layer formed in contact with said p region wherein a thickness of said dielectric layer is such that a dielectric breakdown field F_b of said dielectric layer substantially meets the condition $F_b \geq 1.5 * 10^7$ V/cm;

a metallic layer formed in contact with said dielectric layer; and

at least one voltage biasing source electrically connected to said p region and said metallic layer such that electrons pass through said metallic layer.

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The Examiner states:

Claim 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkham et al. (4,325,084) and Kusunoki et al. (US 2001/0017515 A1) as applied to claims 1-8 and 12-13 above and further in view of Ishio et al. (2001/0014705A1).

Applicant respectfully disagrees with the Examiner's rejection and asserts that claim 21 has been amended to include the allowable subject matter of claim 30. Specifically, claim 21 has been amended to include the limitation "...wherein a thickness of said dielectric layer is such that a dielectric breakdown field F_b of said dielectric layer substantially meets the condition $F_b \geq 1.5 * 10^7$ V/cm...". Applicant therefore asserts that the recited invention of claim 21 is not unpatentable over the Nakagawa et al., van Gorkham et al., Kusunoki and Ishio et al. references. Consequently, the recited invention of claim 21 is allowable.

Since claim 29 is dependent on claim 21, the above-articulated argument with regard to claim 21 applies with equal force to claim 29. Accordingly, claim 29 should be allowed over the Examiner's cited references.

Claims 14-17, 20, 24-25, 28 and 35

The Examiner states:

Claims 14-17, 20, 24-25, 28 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkom et al. (4,325,084) as applied to claims 1-8 and 12-13 in view of Kusunoki et al. (US 2001/0017515 A1).

Applicant respectfully disagrees with Examiner's rejection. Firstly, Applicant asserts that claims 15-17 and 20 have been canceled. Secondly, since claim 14 and 35 are dependent on claim 1 and claims 24-25 and 28 are dependent on claim 21, the above-

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articulated arguments with regard to claims 1 and 21 apply with equal force to claims 14, 24-25, 28 and 35. Accordingly, claims 14, 24-25, 28 and 35 should be allowed over these references.

Claims 18 and 26

The Examiner states:

Claims 18 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkom et al. (4,325,084) and Kusunoki et al. (US 2001/0017515 A1) as applied to claims 1-8 and 12-13 above, and further in view of Morishita (5,140,400).

Applicant respectfully disagrees with Examiner's rejection. Firstly, Applicant asserts that claim 18 has been canceled. Secondly, since claim 26 is dependent on claim 21, the above-articulated arguments with regard to claim 21, apply with equal force to claim 26. Accordingly, claim 26 should be allowed over these references.

Claims 19 and 27

The Examiner states:

Claims 19 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkom et al. (4,325,084) and Kusunoki et al. (US 2001/0017515 A1) as applied to claims 1-8 and 12-13 above, and further in view of Bronner et al. (US 6,242,770 B1).

Applicant respectfully disagrees with Examiner's rejection. Firstly, Applicant asserts that claim 19 has been canceled. Secondly, since claim 27 is dependent on claim 21, the above-articulated arguments with regard to claim 21, apply with equal force to claim 27. Accordingly, claim 27 should be allowed over these references.

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Claims 22 and 30

The Examiner states:

Claims 18 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkom et al. (4,325,084) and Kusunoki et al. (US 2001/0017515 A1) as applied to claims 1-8 and 12-13 above, and further in view of Morishita (5,140,400).

Applicant respectfully disagrees with Examiner's rejection. Firstly, Applicant asserts that claim 30 has been canceled. Secondly, since claim 22 is dependent on claim 21, the above-articulated arguments with regard to claim 21, apply with equal force to claim 22. Accordingly, claim 22 should be allowed over these references.

Claims 23 and 31

The Examiner states:

Claims 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (5,985,708) and van Gorkom et al. (4,325,084) as applied to claims 1-8 and 12-13 above, and further in view of Song (6,153,014).

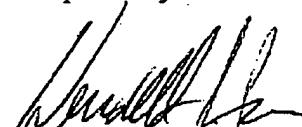
Applicant respectfully disagrees with Examiner's rejection. Firstly, Applicant asserts that claim 31 has been canceled. Secondly, since claim 23 is dependent on claim 21, the above-articulated arguments with regard to claim 21, apply with equal force to claim 23. Accordingly, claim 23 should be allowed over these references.

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Applicant believes that this application is in condition for allowance.

Accordingly, Applicant respectfully requests reconsideration, allowance and passage to issue of the claims as now presented. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,



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